

# PROCEEDINGS

## OF

# THE ROYAL SOCIETY.

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*November 21, 1895.*

Sir JOHN EVANS, K.C.B., D.C.L., LL.D., Vice-President and  
Treasurer, in the Chair.

Mr. F. M'Clean was admitted into the Society.

A List of the Presents received was laid on the table, and thanks ordered for them.

In pursuance of the Statutes, notice of the ensuing Anniversary Meeting was given from the Chair.

Mr. Bianford, Mr. Carruthers, and Mr. Symons were by ballot elected Auditors of the Treasurer's accounts on the part of the Society.

The following Papers were read:—

- I. “On the Gases obtained from the Mineral Eliasite.” By  
J. NORMAN LOCKYER, C.B., F.R.S. Received August 6,  
1895.

Observations have been made of the gases obtained from the mineral eliasite heated *in vacuo*, in the manner which I have described in a former paper,\* and, in addition to lines of known gases, others have been noted, for which no origins can be traced, at the following wave-lengths:—

| Ångström. | Rowland.                 |
|-----------|--------------------------|
| 6121·4    | 6122·4                   |
| 6064·6    | 6065·7                   |
| 5990·2    | 5991·2                   |
| 5874·9    | 5875·9 (D <sub>3</sub> ) |
| 5845·7    | 5846·7                   |
| 5428·8    | 5429·8                   |
| 5403·1    | 5404·1                   |

\* ‘*Roy. Soc. Proc.*,’ vol. 58, p. 68.

The wave-lengths of these lines have been determined by means of a Steinheil spectroscope having four prisms, comparisons being made with adjacent metallic lines, and the positions interpolated by micrometric measurements; the accuracy may perhaps be taken to be within 0.1 tenth metre. Other lines have been noted, but they are not included in the list, for the reason that their wave-lengths have not yet been determined with the dispersion stated above.

Of the lines in the foregoing list, six are in all probability coincident with chromospheric lines, as shown in the following table, which also indicates the frequencies and brightnesses of the lines according to Young:—

Wave-length of Chromospheric Lines.

| (Ångström's scale).      | (Rowland's scale). | Frequency. | Brightness. |
|--------------------------|--------------------|------------|-------------|
| 6121.2                   | 6122.4             | 5          | 3           |
| 6064.5                   | 6065.7             | 5          | 2           |
| 5990.0                   | 5991.6             | 10         | 4           |
| 5874.9 (D <sub>3</sub> ) | 5875.9             | 100        | 90          |
| 5428.8                   | 5429.9             | 8          | 3           |
| 5403.1                   | 5404.1             | 5          | 3           |

It is important to point out that all these lines do not appear in the spectrum at the same time. For instance, in the first two specimens of the mineral no trace of D<sub>3</sub> was noted, but in the third portion examined, all coming from the same specimen, D<sub>3</sub> appeared as a pretty bright line. Again, as in the case of a previous operation on bröggerite,\* in one experiment with eliasite the products of distillation, collected in four stages, gave different spectra.

These facts seem to indicate that the gas obtained from eliasite is either a compound or a mixture of gases, just as is that obtained from bröggerite according to former experiments.

It is also to be remarked that among the lines in the eliasite spectrum, those at 6122.4 and 6065.7 have been recorded in the gases obtained from cleveite, and 6122.4 has also been noted in the gas obtained from gummite.

It seems to be more than probable, therefore, that the lines observed in eliasite indicate a new gas, in some way associated with those given off by cleveite and bröggerite, and the fact that D<sub>3</sub> is not necessarily present in the spectrum, furnishes an additional argument in favour of the view that the gas obtained from cleveite or bröggerite is complex.

\* 'Roy. Soc. Proc.,' vol. 58, p. 194.

## Addendum. Received November 18.

The results in the foregoing paper depend upon eye observations on the red end of the spectrum. Since it was communicated to the Society the blue end has been investigated photographically. Many specimens of eliasite have been distilled, and numerous photographs of the spectra of the gases given off have been taken.

The work has been rendered difficult by the very small quantity of what I believe to be a new gas, and the large quantity of carbonic acid, nitrogen, and hydrogen given off from the mineral. Attempts have been made to get rid of the known gases, in order to make the lines of the new gas better visible, and then the amount of gas was in most cases very small and at times admixed with argon produced by the sparking.

The photographs have been measured and reduced, and it is probable that the lines, or some of them, which cannot be ascribed to any known gases, may belong to the same gas as that giving the lines observed in the red. I append a table of some of these lines, which suggest possible coincidences in stellar and solar spectra; the numbers in brackets indicate the intensities of the lines, 6 being the maximum in the case of  $\alpha$  Cygni, and 10 the maximum in the case of the eclipse spectrum.

| Wave-lengths<br>(Rowland). | Coincidences.      |
|----------------------------|--------------------|
| 3961.4 .....               | $\alpha$ Cygni (6) |
| 4035.2 .....               | Eclipse (2)        |
| 4058.6 .....               | " (1)              |
| 4128.3 } .....             | $\alpha$ Cygni (3) |
| 4131.4 } .....             | " (3)              |
| 4224.0 .....               | Eclipse (1)        |
| 4255.7 .....               | " (1)              |
| 4442.5 .....               | " (3)              |

In addition to the above lines there are others with which no celestial coincidences have been traced.

Some of the unknown lines at first noted in the red have been observed again in the gases obtained from other specimens; it is important to note that remarkable variations in the spectra have been observed in passing from one specimen to another.

Although the evidence in favour of a new gas is already very strong, no final verdict can be given until the spectra of all the known gases, including argon, have been photographed at atmospheric pressure and the lines tabulated. This part of the inquiry is well in hand.